

REMARKS

Applicant has carefully reviewed the Official Action dated July 12, 2002 for the above identified patent application.

The Specification has been amended to correct the objection noted at page 2, paragraph 2 of the Official Action.

At page 2, paragraph 1 of the Official Action, the Examiner states that the co-pending application identified in the Information Disclosure Statement filed by Applicant on June 22, 2001 should be identified in the Specification, and not included in an Information Disclosure Statement. Applicant respectfully disagrees with the Examiner, and has elected not to amend the Specification to identify the co-pending application. Since the present application is not claiming the benefit of the date of the co-pending application, Applicant respectfully submits that it is not necessary to identify the co-pending application in the present specification.

At page 2, paragraph 4 of the Official Action, Claim 1, the only claim pending in this application, has been rejected under 35 U.S.C. Section 102(b) as being anticipated by Jansson et al (U.S. Patent No. 4,760,887).

At page 3, paragraph 5 of the Official Action, Claim 1 has been rejected under 35 U.S.C. Section 102(b) as being anticipated by Larsson (U.S. Patent No. 4,861,209).

At page 3, paragraph 7 of the Official Action, Claim 1 has been rejected under 35 U.S.C. Section 103(a) as being obvious over Jansson et al in view of Ekloff et al (U.S. Patent No. 4,687,368).

At page 4, paragraph 8 of the Official Action, Claim 1 has been rejected under 35 U.S.C. Section 103(a) as being obvious over Larsson in view of Eklof et al.

For the reasons to be discussed below, Applicant respectfully submits that independent Claim 1 is neither anticipated or suggested by the prior art applied in the Official Action, and respectfully requests that the rejection of the claim be reconsidered and withdrawn.

Independent Claim 1 is directed to a thread coupling for a drill string (4) for percussive rock drilling, and the claim expressly recites that a male thread (5) and a female thread (6) are conical. The advantages of the thread coupling defined by the claim are discussed in the Specification. See, for example, page 1 which discusses known thread couplings for percussive rock drilling subject to breakage of the drill rod adjacent to the drill bit on the skirt of the drill bit adjacent to the inner

thread of the drill bit. As discussed, these breakages occur because the drill rod adjacent to its end surface in contact with a bottom impact surface of the drill bit is pre-stressed by deformation occurring at the shock wave passage through the thread coupling, in combination with the applied torque. The Applicant has discovered that a thread coupling including a combination of conical threads in a well rounded crest of threads, as recited in independent Claim 1, shifts the position of the pre-stressing of the threads away from the contact surface between the end surface of the drill rod and the bottom impact surface of the drill bits. This occurs because the pitched angle of the thread is larger at smaller thread diameter than at a larger thread diameter, constant pitch. As a result, the cause of breakage of the drill rod experienced by the known thread couplings for drill strings for percussive rock drilling is eliminated.

The Jansson et al patent (U.S. Patent No. 4,760,887), which was applied alone as anticipating Claim 1, and was also applied in combination with a secondary reference, clearly does not teach or suggest a male thread and a female thread which are conical, as expressly recited in independent Claim 1. On the contrary, both the Abstract of the Disclosure and the Specification (column 1, lines 30 - 32) of Jansson et al refer to "cylindrical" screw threads. This patent does not teach or suggest the use of conical threads as disclosed and claimed by Applicant, and does not recognize or suggest the advantages of using conical threads

in a thread coupling for a drill string for percussive rock drilling, as expressly discussed in Applicant's specification.

It is well established that a rejection of a claim as being anticipated by a prior art reference requires the Patent & Trademark Office to establish a strict identity of invention between the claim and the applied prior art reference. Stated in other words, it is improper to reject a claim as being anticipated unless a single prior art reference discloses all features of the claim, as arranged in the claim. See, for example, Connell v. Sears Roebuck & Co., 220 USPQ 193 (Fed. Cir. 1983). Since the Jansson et al patent teaches away from a conical thread coupling by advocating cylindrical thread coupling, it clearly does not anticipate independent Claim 1.

Similarly, the combination of Jansson et al and Eklof et al does not teach or suggest the claimed invention. The Abstract of Eklof et al expressly recites "A thread structure for interconnecting two elements in a percussive drill string comprising an interior cylindrical thread and an exterior cylindrical thread..." [emphasis added]. Therefore, Eklof et al, like Jansson et al, discloses and advocates the use of cylindrical screw threads. This patent does not teach or suggest the conical thread coupling disclosed and claimed by Applicant, or the advantages of the conical thread coupling recognized and discussed by Applicant. Thus, there is clearly no suggestion in the prior art itself to combine Jansson et al with Eklof et al in

any manner rendering independent Claim 1 obvious. Moreover, even if such combination were to be made, the resultant device would not include a conical thread coupling as recited in Applicant's independent Claim 1, nor would it recognize the advantages of a conical thread coupling as discussed in Applicant's specification.

Independent Claim 1 has also been rejected as being anticipated by the Larsson patent. Applicant respectfully submits that there is simply no disclosure in the Larsson patent teaching (or suggesting) a conical thread coupling for a drill string for percussive rock drilling, as disclosed and claimed by Applicant. Moreover, there is no teaching or suggestion in the Larsson patent of the advantages of using a conical thread coupling for a drill string for percussive rock drilling, as recognized by Applicant and discussed in Applicant's specification. The Larsson patent by itself clearly does not anticipate (or suggest) the thread coupling expressly recited in independent Claim 1.

Independent Claim 1 has also been rejected as being obvious over a combination of the Larsson patent with Eklof et al. As noted above, the Eklof et al patent expressly discloses an interior cylindrical thread and an exterior cylindrical thread, and therefore does not teach or suggest a conical thread coupling as disclosed and claimed by Applicant. Since neither Larsson or Eklof et al suggest a conical thread coupling, there is clearly

no suggestion in the prior art itself to combine these references in any manner rendering independent Claim 1 obvious. Moreover, even if these two references were to be combined, the resultant combination will not teach or suggest the conical thread coupling claimed by Applicant since neither of the combined references teach or suggest a conical thread coupling or the advantages thereof recognized and disclosed by Applicant.

Applicant further notes that the Larsson patent was cited in the Information Disclosure Statement filed with the original United States application papers. As discussed in that Information Disclosure Statement, the Larsson patent (U.S. Patent No. 4,861,209) corresponds to Swedish Patent No. 460,550 which was cited in the International Search Report conducted in connection with the corresponding PCT application. Swedish Patent No. 460,550 was cited in Category A indicating that the document defines the general state of the art but was not considered to be of particular relevance to the claim of the PCT application, which corresponds to the claim pending in the United States application. Additionally, the International Preliminary Examination Report conducted in connection with the corresponding PCT application considered Swedish Patent No. 460,550, among others, and concluded that the PCT claim, which corresponds to the pending United States claim, was patentable over that reference.

For the reasons discussed herein, Applicant respectfully submits that neither the Jansson et al patent or the Larsson patent alone anticipates (or suggests) the thread coupling disclosed and defined by independent Claim 1, or recognizes or suggests the advantages of using a conical thread coupling for a drill string for percussive rock drilling as discussed in Applicant's specification. Similarly, a combination of Jansson et al or Larsson with Eklof, which itself does not recognize or suggest a conical thread coupling, does not recognize or suggest the advantages of a conical thread coupling in a drill string for percussive rock drilling as discussed by Applicant, and therefore does not render independent Claim 1 obvious. Applicant respectfully submits that independent Claim 1 is allowable over the prior art applied in the Official Action, and favorable action is respectfully requested.

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In the Information Disclosure Statement filed by Applicant on March 27, 2001, Applicant cited four (4) references namely U.S. Patent Nos. 3,933,210 and 4,861,209; Norway Patent No. 74,549, and G.B. 632,556. Copies of these references were enclosed with the Information Disclosure Statement, and these references were identified on Form PTO Form-1449. Applicant respectfully requests that these references be formally cited of record in connection with the present application. Applicant notes that although U.S. Patent No. 4,861,209 was, in fact,

applied to reject the claim, it was not identified in the Notice of References cited.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'Mark P. Stone', with a stylized flourish at the end.

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Serial No. 09/806,220

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REVISED SPECIFICATION - PAGE 1, FOURTH PARAGRAPH

An embodiment of the invention is described below with reference to the accompanying drawing in which [fig 1] Fig. 1 shows a drill string with a thread coupling according to the invention. Fig. 2 is a section through a thread coupling according to the invention.

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